

**CLAIMS**

- 1 A process for the separation of alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids from a fatty acid mixture comprising linear and alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprises:
  - (i) optionally hydrogenating the fatty acid mixture,
  - (ii) cooling the mixture to form crystals, and
  - (iii) separating the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids from the mixture by dry fractionation.
- 2 A process according to claim 1 wherein the fatty acid mixture comprises greater than 95% by weight of saturated fatty acids, and less than 5% by weight of unsaturated fatty acids.
- 10 3 A process according to either one of claims 1 and 2 wherein the fatty acid mixture comprises 40 to 65% by weight of alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids, and in the range from 35 to 60% by weight of linear C<sub>12</sub> to C<sub>24</sub> fatty acids.
- 4 A process according to any one of the preceding claims wherein the fatty acid mixture comprises
  - (i) less than 4% by weight of C<sub>14</sub> fatty acids, and/or
  - (ii) in the range from 10 to 35% by weight C<sub>16</sub> fatty acids, and/or
  - (iii) in the range from 50 to 75% by weight of C<sub>18</sub> fatty acids, and/or
  - (iv) in the range from 3 to 15% by weight C<sub>20</sub> fatty acids, and/or
  - (v) in the range from 2 to 10% by weight of C<sub>22</sub> fatty acids.
- 20 5 A process according to any one of the preceding claims wherein the fatty acid mixture comprises in the range from 15 to 30%, preferably 20 to 25% by weight C<sub>16</sub> fatty acids.
- 6 A process according to any one of the preceding claims wherein the fatty acid mixture comprises in the range from 55 to 65%, preferably 57 to 63% by weight of C<sub>18</sub> fatty acids.
- 7 A process according to any one of the preceding claims wherein the weight ratio of C<sub>18</sub> to  
25 C<sub>16</sub> saturated linear fatty acids present in the fatty acid mixture is in the range from 0.4 to 1.5:1, preferably 0.5 to 1.2:1.
- 8 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprise in the range from 73 to 95% by weight of branched fatty acids, and in the range from 5 to 27% by weight of linear fatty acids.
- 30 9 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprise
  - (i) less than 3% by weight of branched C<sub>14</sub> fatty acids, and/or
  - (ii) in the range from 2 to 12% by weight of branched C<sub>16</sub> fatty acids, and/or
  - (iii) in the range from 55 to 85% by weight of branched C<sub>18</sub> fatty acids, and/or
  - (iv) in the range from 2 to 12% by weight of branched C<sub>20</sub> acids, and/or

- (v) in the range from 1 to 8% by weight of branched C<sub>22</sub> fatty acids.
- 10 10 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprise in the range from 4 to 10%, preferably 6 to 8% by weight of branched C<sub>16</sub> fatty acids.
- 5 11 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprise in the range from 60 to 80%, preferably 65 to 75% by weight of branched C<sub>18</sub> fatty acids.
- 12 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprise
- 10 (i) in the range from 3 to 14% by weight of linear C<sub>16</sub> fatty acids, and/or  
(ii) in the range from 0.5 to 6% by weight of linear C<sub>18</sub> fatty acids.
- 13 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids comprise C<sub>18</sub> to C<sub>16</sub> saturated linear fatty acids present at a weight ratio in the range from 0.1 to 0.7:1.
- 15 14 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub>-C<sub>24</sub> fatty acids comprise greater than 90% by weight of saturated fatty acids, and in the range from 0 to 10% by weight of unsaturated fatty acids.
- 15 15 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub>-C<sub>24</sub> fatty acids have
- 20 (i) an acid value in the range from 175 to 205 mgKOH.g<sup>-1</sup>, and/or  
(ii) a saponification value in the range from 175 to 210 mgKOH.g<sup>-1</sup>, and/or  
(iii) an unsaponifiable value of less than 7 g.100 g<sup>-1</sup>, and/or  
(iv) an iodine value of less than 6 g.100 g<sup>-1</sup>, and/or  
(v) a cloud point in the range from 0 to 10°C, and/or  
25 (vi) a colour value of less than 150 Hazen units.
- 16 16 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids have a cloud point in the range from 0 to 8°C, preferably 0 to 6°C.
- 17 17 A process according to any one of the preceding claims wherein plate-like crystals are formed during cooling.
- 30 18 A process according to claim 17 wherein the plate-like crystals have a mean aspect ratio in the range from 1 to 2:1.
- 19 19 A process according to either one of claims 17 and 18 wherein the plate-like crystals have a mean crystal diameter in the range from 250 to 500 µm.
- 20 20 A process according to any one of the preceding claims wherein the fatty acid mixture is initially heated to a temperature in the range from 48 to 80°C.

- 21 A process according to any one of the preceding claims wherein the fatty acid mixture is cooled to a temperature in the range from 7 to 16°C.
- 22 A process according to any one of the preceding claims wherein the alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acids are separated by filtration.
- 5 23 A process according to any one of the preceding claims wherein the weight ratio of C<sub>18</sub> to C<sub>16</sub> saturated linear fatty acids present in the fatty acid mixture is adjusted prior to or during the cooling stage, preferably by the addition of palmitic acid.
- 24 A process according to claim 23 wherein in the range from 0.5 to 15 g of palmitic acid is added per 100 g of fatty acid mixture.
- 10 25 An alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acid mixture comprising
  - (i) less than 3% by weight of branched C<sub>14</sub> fatty acids,
  - (ii) in the range from 2 to 12% by weight of branched C<sub>16</sub> fatty acids,
  - (iii) in the range from 55 to 85% by weight of branched C<sub>18</sub> fatty acids,
  - (iv) in the range from 2 to 12% by weight of branched C<sub>20</sub> fatty acids,
  - 15 (v) in the range from 1 to 8% by weight of branched C<sub>22</sub> fatty acids, and
  - (vi) the weight ratio of C<sub>18</sub> to C<sub>16</sub> saturated linear fatty acids is in the range from 0.15 to 0.5:1.
- 26 An alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acid mixture according to claim 25 comprising
  - (i) in the range from 3 to 12% by weight of linear C<sub>16</sub> fatty acids, and
  - 20 (ii) in the range from 0.5 to 6% by weight of linear C<sub>18</sub> fatty acids.
- 27 An alkyl branched C<sub>12</sub> to C<sub>24</sub> fatty acid mixture according to either one of claims 25 and 26 having
  - (i) an acid value in the range from 170 to 195 mgKOH.g<sup>-1</sup>,
  - (ii) a saponification value in the range from 85 to 210 mgKOH.g<sup>-1</sup>,
  - 25 (iii) an unsaponifiable value of less than 7 g.100 g<sup>-1</sup>,
  - (iv) an iodine value of less than 6 g.100 g<sup>-1</sup>,
  - (v) a cloud point of less than 10°C, and
  - (vi) a colour value of less than 250 Hazen units.